

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of:

Connect America Fund	WC Docket No. 10-90
A National Broadband Plan for Our Future	GN Docket No. 09-51
Establishing Just and Reasonable Rates for Local Exchange Carriers	WC Docket No. 07-135
High-Cost Universal Service Support	WC Docket No. 05-337
Developing an Unified Intercarrier Compensation Regime	CC Docket No. 01-92
Federal-State Joint Board on Universal Service	CC Docket No. 96-45
Lifeline and Link-Up	WC Docket No. 03-109

COMMENTS OF EMPIRIX, INC

Empirix, Inc, hereby submits its comments on the Commission's Notice of Proposed Rule Making (NPRM) to reform and modernize the Universal Service Fund (USF) and Intercarrier Competition (ICC). The Commission's reform proposal is based around four key principles: 1) Modernize USF and ICC for Broadband; 2) Fiscal Responsibility; 3) Accountability; and 4) Market-Driven Policies. As a telecommunications technology company with a long history of solving some of the telecommunications industry's most difficult service reliability problems, Empirix offers a unique perspective on transparency and service accountability for both voice and broadband communications.

Empirix is a technology company based in Bedford, Massachusetts that helps organizations worldwide to accelerate the development, deployment and operations of new IP communications by validating the quality of user experience and overall performance of complex networks and applications. As deployment and usage of broadband, especially in remote areas, expands, it is important service providers aggressively address reliability service quality problems while providing this information back to consumers. The Commission's proposal reflects this concern, especially at Paragraphs 90-148. Empirix technology gives service providers the tools to ensure

that taxpayer-supported voice and broadband services meet the public interest goals set out by Congress and the Commission. Additionally, Empirix tools have the capability to ensure that consumers are educated about the quality and level of service actually provided by an individual provider.

Public Interest Obligations of Fund Recipients. The Commission seeks comments on a wide variety of issues related to the public interest obligations of fund recipients. In its NPRM, the Commission notes the need to ensure that service providers supported by contributions from the taxpayer into the Fund are meeting the public interest. Empirix supports the view that those providers who are benefiting from the public investment in their services through the fund should meet clear obligations regarding the use of those funds. This gives service providers an understanding of how funding should be used while giving the taxpayer an understanding of what benefits they will receive from the investment.

In the case of the USF program as it is currently implemented, funding is to be used for the growth and maintenance of telephone service in qualifying areas. In the world that existed when the Fund was initially developed, these were simple metrics to measure and consistently meet – one either had service or one did not. Copper wires based around central offices and switching stations formed the backbone of the service, and they generally provided stable and reliable service for voice communications.

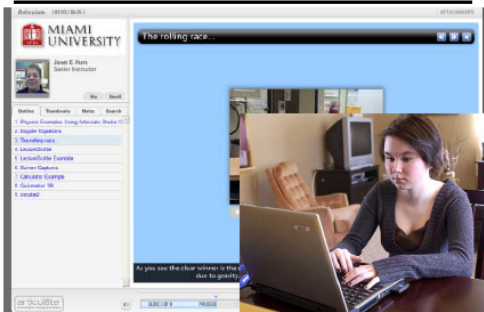
Today's world of both voice and broadband communications technology is much different - much less resistant to service problems. Hard switches have been replaced by computer-based systems, wireless and fiber optics now carry transmissions, and the structure of these transmissions have completely changed. These changes have opened the door to the telecommunications and Internet revolutions of the years since the 1996 Telecommunications Act,

but they have also opened the door to a growing list of reliability challenges that threaten more than simple consistent service quality and reliability.

Focus on How Broadband is Used, Not Simply Broadband. The overall reforms outlined by the Commission in its NPRM, including the transition of the USF to the broadband-supporting Connect America Fund require that the Commission, participating service providers, eligible communities, Congress, and taxpayers take notice of these increased issues regarding service quality and their impact on the public interest. Because of this, Empirix strongly supports efforts to address service quality as part of the public interest requirements placed on participating service providers, especially for broadband and other “IP-based” communications technologies receiving support under the USF or its successor fund, the Connect America Fund.

As Broadband Becomes a Bigger Part of Our Lives, Need for Quality Service Increases

Students Miss Parts of a Lecture



Doctor's Orders are Not Clear



Other Examples:

- 911 Calls Don't Get Through
- Full-Network Degradation in Time of Emergency

Need to Focus on People and How They Use Broadband Instead of Just Broadband

As outlined in the visual above, Empirix strongly feels that to gain a true picture of broadband, one must focus on how the service is being used, not simply the presents of that service. Broadband may be available in an area, but if it is not of sufficient speed to handle the large data packages transferred between designers and manufacturers, what good does it truly provide the user? If broadband is available, yet its service quality is not capable of allowing a student to take streaming video classes, then is there truly a broadband connection available to that home? We believe this needs to be an underlying principle of how the Commission views the public interest obligations under the USF/CAF program moving forward.

Under the Public Interest proposal put forward, Empirix supports the Commission in its request to have the required broadband service metrics cover all technologies and methods of obtaining broadband service. Empirix's technology enables service providers to monitor service quality and reliability across wired, wireless, cable, internal LAN, satellite, and all forms of IP communication. Customers today are focused on obtaining quality broadband service at the most reasonable price to meet their needs - they are not wedded to a single service technology. Furthermore, the rural areas that depend the most on USF supported services often require varied service technologies to provide broadband service that meets the demands of the customer. This is supported by the data obtained by the Commission as part of the National Broadband Map effort funded under the Recovery Act. Rural broadband customers are served by DSL, cable, cellular-tower based wireless, satellite, and other broadband technologies. With the Commission's proposal to support almost all of these technologies through the Connect America Fund, ensuring service quality across all of these technologies is critically important.

User Experience - It's More than Just Speed. The Commission should be applauded for recognizing that speed is only one measure of service quality. Many of those focused on broadband view speed as the only element or metric that determines the quality of service received by a

customer. Empirix views broadband service along the lines of a three legged stool, with access as the first leg, speed as the second, and service quality and reliability as the third. Each of these must be strong and well-maintained for the stool to remain in balance and not topple over. As noted above, Empirix technology gives service providers the tools to monitor a broad range of data across their broadband, voice, or IP-based network. Below is an outline of the data metrics that can be monitored by Empirix technology.

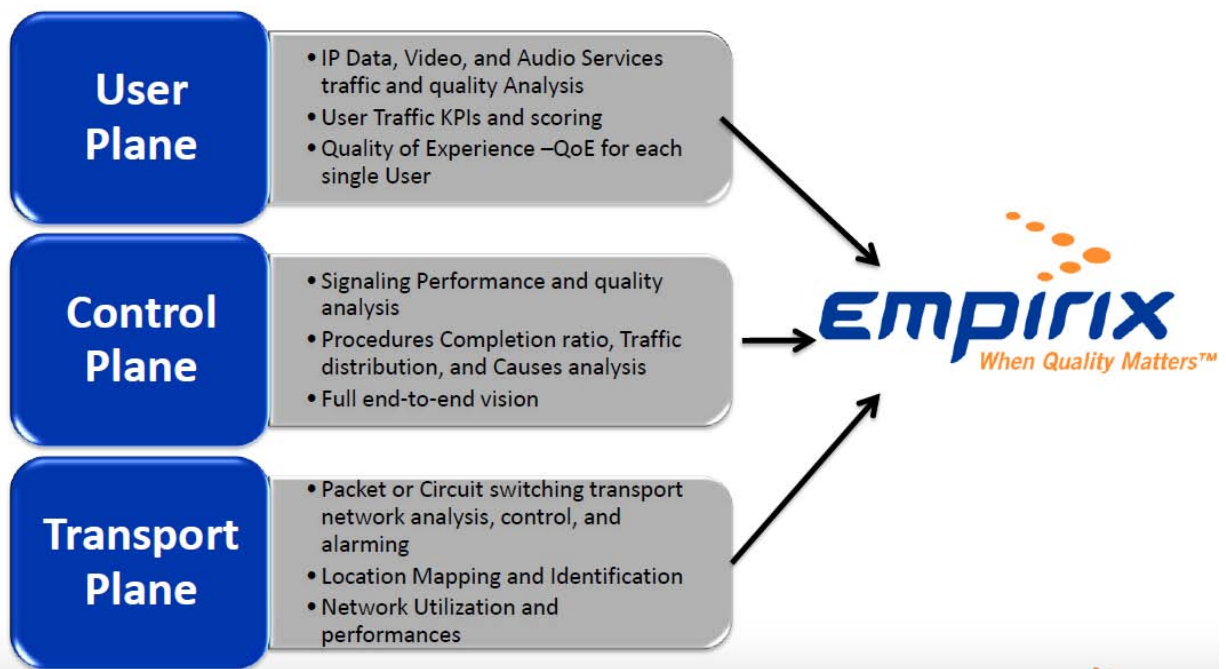
Empirix Monitors a Broad Range of Data

- **Customer Information**
 - Subscriber identification
 - Cable Infrastructure
- **Call characteristics**
 - Success or Failure status
 - Call length
 - PDD
 - Connect Latency
 - MOU
- **Media Quality Statistics**
 - Jitter
 - Latency
 - Packets Lost
 - R-factor
 - MOS
 - 1-way audio
 - Burst/Gap
 - Inter-arrival analysis
- **Network Topology**
 - Nodes
 - Paths
 - Links
- **IMS Methods**
 - MWI
- **IMS Transactions**
 - REGISTERS
 - NOTIFY
 - OPTIONS
 - INVITES
 - ...
- **Regional System Statistics**
 - Top Callers
 - Regional metrics
 - Defects per Million
 - Minutes of Use
 - BHCA
- **Error Information**
 - By Type
 - By Code
- **Time based information**
 - Frequency
 - When things happen

Empirix's solutions are generally structured as global monitoring solutions, giving service providers the ability to monitor all of these data metrics and turn this information into a valuable tool to ensure the service reliability of their network. This is not just an important benefit to the Commission and those monitoring the accountability of how USF/CAF funds are used, but also

provides an important benefit to service providers. Indeed, that is the core of why Empirix's systems are used by telecommunications service providers across the globe. Our service quality tools give providers the ability to proactively troubleshoot problems, reduce costs, resolve problems more quickly and increase customer (and in the case of USF/CAF supported services, taxpayer) satisfaction. Because of this, our tools provide on average a 300 percent return on investment for the service provider, and if funded through USF/CAF funds, this small investment would provide a significant return in helping ensure that taxpayer funds are supporting the goals of the program.

Empirix offers a single solution for all the communication processes



Service Quality Metrics – How to Measure. Our experience working with service providers and with their customers has led us to the conclusion that any type of service quality or reliability metric must be based on the needs and demands of how the connection is being used. In Paragraph 105 through 107, the Commission highlights this application-focused approach as the best way to measure service quality and reliability. Empirix applauds the Commission for taking this approach and feels very strongly that given the capabilities of monitoring systems today and into the future, such application-focused approaches can be implemented at limited cost while providing significant benefit to the taxpayer and the service provider.

In Paragraph 115, the Commission notes its current partnership with SamKnows, a third-party measurement company that is under contract with the Commission to conduct a project to monitor broadband service speed and quality for a select group of users. This information will be important as the Commission works to develop service quality metrics under this NPRM. However, the system used by SamKnows is not appropriate for a long-term service quality monitoring solution of service provided under USF/CAF for the following reasons:

- It requires an in-home installation;
- It provides simply a snapshot of service conditions;
- It only covers a small amount of users, not all users and not all points on the network; and
- It does not provide any “dashboard” monitoring ability by the service provider to allow for troubleshooting and other capabilities.

Under a service quality metrics system for USF/CAF supported services, the Commission should require that providers install a service quality monitoring solution that looks at the entire network and provides real-time information. For instance, with Empirix technology, as soon as the quality of the connection degrades below a provider’s defined threshold, the network operations team is alerted so that they can take action. This not only assures that the end user is receiving quality service, it also provides the “real-time” feedback to the service provider that the network

and its components are functioning as designed. Without such a reliability solution, it is up to the end user complaining that they are unsatisfied with the service they are receiving before the service provider can address the problem. Not only does this delay add cost to resolving problems, but it will also increase the number of unsatisfied customers.

Because providers are using such a technology, they are in a position to measure their network performance on constant, connection-by-connection basis. Indeed, the technology available through Empirix enables the generation of records that represent the true end-to-end view of any session. This is the foundation for accurate metrics and reports far more accurate and detailed than the information required by the Commission's Form 477 or the SamKnows system because it speaks not simply to the potential broadband service but specifically to the actual service provided and its quality.

We support the general recommendations behind Paragraph 116 regarding testing of services to a standard set by the Commission and their reporting to the Universal Service Administrative Company. We also agree that under some systems such a testing and reporting scheme could be very costly to service providers. With the technology developed by Empirix and in use by service providers across the globe, such testing and information gathering is not only more complete, but is also essentially costless as these providers are testing and gathering information about the quality of the network and the user experience constantly as part of their maintenance and monitoring efforts.

The monitoring technology developed by Empirix allows for constant and dynamic end-to-end service quality and speed monitoring across every user and every access point, not isolated and static monitoring as offered through other, more traditional technologies. This would not only meet, but also exceed the goals for monitoring as outlined by the Commission in Paragraph 117. Empirix technology also allows service providers to monitor mobile, wired, and other services on the same piece of equipment and with the same low-cost investment.

Recommended Amendments to Proposed Rule. To assist the Commission with achieving the goals of its reform proposal and the positions of Empirix as outlined in the above comments, below are recommended amendments to the Commission's proposed rule:

§ 54.101 Supported services for rural, insular and high cost areas.

(a) Services designated for support. The following services or functionalities shall be supported by federal universal service support mechanisms:

(9) Application-based service quality monitoring. "Application-based service quality monitoring" means technology that allows monitoring of network service quality focused on speed, jitter, latency, and other industry measures as defined by the Commission.

§ 54.1009 Public Interest Obligations

(a) Applicants receiving support under this section must perform the following under their public interest obligations:

(1) *Speed.* Applicants must provide broadband speeds of 4 Mbps downstream (actual) and 1 Mbps upstream (actual), subject to specified exceptions.

(2) *Coverage requirement.* Applicants must comply with the coverage requirement established by the Commission and must comply with all reasonable requests for service from end users in its coverage area.

(3) *Service Quality.* In addition to the Speed requirements outlined in (1) above, Applicants must comply with the application-based service quality and user experience standards established by the Commission.

~~(34)~~ *Deployment and duration of obligation.* Applicants must complete deployment within three years after receiving support and must fulfill provider obligations under this section for five years upon completion of deployment.

§ 54.1011 Oversight

(a) Parties receiving support are subject to random compliance audits and other investigations to ensure compliance with program rules and orders.

(b) Parties receiving support shall submit to the Commission annual reports for eight years after they qualify for support. The annual reports shall include:

- (i) Electronic coverage maps illustrating the area reached by new services at a minimum scale of 1:240,000;
- (ii) A list of relevant census blocks previously deemed unserved, with total resident population and resident population residing in areas reached by new services (based on 2010 Census Bureau data and estimates);
- (iii) A report regarding the services advertised to the population in those areas;
- (iv) Data received or used from speed and application-based service quality tests analyzing network performance for new broadband services in the area for which support was received.

Conclusion. Empirix thanks the Commission for the opportunity to submit these comments and for its efforts to reform the USF program to provide broadband access for Americans in rural and underserved areas. As outlined in our comments, a key aspect of that service is to ensure that broadband meets measurable service quality standards, especially as the demands on broadband increase through video, VOIP, and other real-time applications. Through our comments, we have shown a way forward for the USF/CAF program that allows for monitoring of the user experience under varied situations at a limited cost to service providers.